NEW IDEAS ON

ALPHABET

Their Learning Printing And Future

Sadhu Subrahmanyam Sarma

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To
My Father

Sri Sadhu Lakshmi Narasimha Sarma of Manesamudram, who taught me
to be dissatisfied with past and present,
to take strength from both,
and struggle for the future,
with confidence in man.

Acknowledgment : British Council Library, Madras, being the only institution to my knowledge providng postal library facility.

Apology: : To my countrymen for writing in English and to the English public for my Indian English.

CONTENTS

BRING OUT A PROTOTYPE

Prof. N. Lakshminarayana
Head of Electronics & Commn. Engineering,
J. N. T. U. College of Engineering,
Kakinada.

The novel method of audio-composing machine suggested by sri Subrahmanyam Sarma promises to revolutionalise the future printing technology. Combined with the developments taking place in auto-translation systems these machines will pave way to future autotranslation-cum-printing technology.

The machine suggested by sri Sarma however has to overcome a good number of teething troubles. The major problem in the machine will be to actuate an individual photocell without actuating any other adjoining ones. The problem is quite serious and involves tremendous efforts

I hope the ideas given by Sri Sarma will attract many more to this novel idea and help its successful completion. When successfully completed this will be a boon to the human race.

I congratulate Sri Sarma for his present work and wish him all success in bringing out a prototype of the machine in the near future.

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A TOTALLY NEW CONCEPT-SADHU SCRIPT

B. V. Sathya Murthy,
Advertising Consultant.
Creative Graphic Designer & Cartoonist,
Hyderabad

I have seen the new Sadhu Script prepared by Sri Sadhu Subraumanyam garu. With lesser intricacies in design and fewer number, naturally they are more prone for graphic communication also.

This script almost fills the lacuna felt by the graphic designers in retaining the elegance while presenting the script.

It deserves due consideration by all concerned with communication of ideas and linguists.

It presents a totally new concept to the subject. I wish the efforts of the author a grand success. His work richly deserves all encouragement from all concerned quarters.

Smt Addepalli Mahalakshmi Devi College of Education for Women

Principal,
Sri V.S.N. Murthy, M.SC , M.ED., M. A.,

Rajahmundry-533 I03
Date 23-1-1980.

Sri S. Subrahmanyam Sarma has shown me some of the materials prepared for the 'Finite symbol composition.' method of alphabet teaching and I have also gone through the booklet explaining the background and development of this method.

This is a novel method of teaching the alphabet which when developed fully can be applied to many languages. The method will save lot of time and effort (to learn the alphabet) on the part of the child. Learning will be quicker.

Some experimentation under class room conditions is necessary to modify if necessary and bring the method to a final form. This project richly deserves encouragement,

V. S. N. Murthy,
Principal

—()—

Resolution passed by the Elementary School Teachers Association, Tallarevu (E. G. Dt., A.P.) Centre on 19-1-1980 (Membership : 80 – Attended 56).

Having heard the demonstrative exposition of Sri S. Subrahmanyam Sarma on alphabet teaching, we unanimously agree that the aids developed by him through his researches will be very useful to Elementary School children learning alphabet. His work is eommendable.

We unanimously express our ardent hope that in future all the children in elementary schools will learn their alphabet very easily and happily adoptinghis new method.

K. Janikiramudu,
Joint Convenor.

—()—

Sri Subrahmanyam garu,

We feel that the teaching aids and easy letter charts designed by you for easier and more simplified teaching in schools are very useful to children. We believe that such aids are quite essential to all schools.

Chekka Veeraraju,
Convener,
Retd. Samithi School Teachers' Assn..
TALLAREVU.

—()—

Sri Subrahmanyam garu,

We agree that the method prepared by you will have good results if adopted in case of adults.

Ithampudi Ksheerasagaram;
Bapuji Ideal Service Society,
Tallarevu, Kakinada Tq.

TIME TO TAKE STOCK

The evolution of alphabet as a primary unit of writing. represents an important milestone in the history of human culture. Both, as a means of recording human thought and as a means of communication, writing still enjoys a powerful position. Unlike certain other facets of human culture, like political and ethical systems, which react to social changes quickly, language and script are hard to change. But changes there have been, certainly. The script of every language has departed from its original shapes unrecognizably, of course, over a period of millenia.

Now, our world is ushered into the atomic age, (space age?) surpassing all previous ages. Information explosion is in the air. Satellite utility for communication is the norm of the day. Cybernetics and electronics are fast developing. Above all, the need for quick communication of highly specialized, complex and diverse thought to vast strata and stretches of population is ever growing. In this background it is time we take stock of the limits, which the present alphabet structure and printing methods impose, (even allowing for their likely future developments) and search for a totally different approach with greater possibilities.

Some ideas are sparked off in this direction in this monograph. They have to catch the imagination of the nations, wade their course through wearing out (but still strong) traditions, and gather momentum before they can claim a rank in the unifying forces, forging humanity into one world practice.

The foundation for the ideas (sometimes apparantly wild) propounded in the following pages is the simple law of nature that *any set of plane or solid geometric shapes, however numerous or diverse, can be built up by manipulating multiples of a small finite types of simpler shapes or solids*

The application of this law to methods of teaching alphabet writing is sufficiently developed to be taken up readily on a pilot scale, tested and refined on the basis of further experience (if any) and adopted on a large scale (if not wholesale) at least in case of phonetic scripts. Though this method is developed mainly from experiences with Telugu children, it stands good for any child learning a phonetic script and has relavence to nonphonetic scripts. The application of this law to process of composing could not go far beyond paper stage.

Hope the sparks will kindle into flame.

ALPHABET LEARNING

Should children be taught and untaught ?

THE PRESENT

Psychology has made lot of strides in revealing the natural principles involved in a child learning to read, write and learn various subjects like language, arts, science and history. Not much work is done on teaching and learning of particular technical skill of writing alphabet. No significant improvement is seen in these skills during the past half a century.

Perhaps, Madam Maria Montessori has the last word on this subject. She was the first to make a scientific approach in this area. based on keen observation of the child. She was the first to explain the processes taking place in child's mind in the course of the development of intellegence. accumulation of knowledge and attaining skills. As a part of evolving new methods for imparting education to a child, she evolved a new method for imparting technical skill of writting alphabet. Its operations essentially consisted in forming words interesting to the child with movable alphabet pieces, practicing of drawing with forefinger on sandpaper surfaces of movable alphabet pieces, colouring areas and path, covered by alphabet formed or written by suitable equipment and preceded by various exercises of painting different shaped areas to learn to distinguish between shapes, sizes etc., Her experiments as early as the first decade of this century showed 'children happily entering the phase of "writing explosion." At the age of three, children in 'House of children" could write a good hand with group similarity, though 'with apparant absurdity, that they could not read by that time.

Though Maria Montessori and her methods are universally acclaimed, though her findings greatly influenced the parenthood of later generations, they have not been universally practiced. The adult world is guilty of lot of hypocrisy in this regard as it has ever been with any ideal, in any field, Lincoln and Gandhi being similar parllels. The scientific gains are confined to a narrow section of children's population in special Montessori type schools.

A large section of children's world acquires the technical skill of drawing alphabet by rotewriting, though, the drudgery and child's resistance to it are sought to be mitigated by various halfhearted means like giving various preliminary exercises in strokes and curves etc., Whatever the means adopted, whatever the time taken, the result is that the child's first writing is never fair and acceptable to the adult. But since other aspects of education cannot wait and the child has to be hurried through writing after all, its "bad" and "imperfect" hand is treated as an inevitable stage of writing to be tolerated, to be later "reformed" over a course of time extending up to a decade of 'copy writing' or 'fair copying or by whatever name it is called. One is not sure to what extent this culmination of faircopyr ing even after a decade is due to—the teacher or parent being no more able to enforce it on a grown up child rather than fulfilment of the objective. Whatever the method phonetic or unphonetic or a convenient (opportunist?) combina tion of both, the (fair) copying practice appears to be a universally prescribed tonic for a child.

Thus, learning to write the shapes of alphabet somehow first, then unlearn it and relearn to write fairly – this appears to be the mode in practice. The final fairhand is an unusual accomplishment by a minority of the learned, only to be lost again, in course of its use under various circumstances and stresses, ranging from lethargy to urgency, from consciousness of purposelessness to positive hatred to writing.

Toys, mechanical toys, grooved alphabet. attractive preparatory books, attractive charts, gaudy coloured plastic letters, look and say charts and workbooks are some of the goods that modern industry has showered on its children's world, at least up to the level of middleclass, in exchange to the leisure of mothers (forced into employment) it has devoured and the economic division amongst godlike children into publicschool going, common school going and child labour it has created. Some of these "aids," at least in my context, go to show the purely commercial (and callous?) treatment meted to their subjects.

It is in this background that some thinking was made as to how best the children could be helped out of this situation, to acquire the skill of learning, to draw alphabet smoothly. The new method evolved is discussed below.

The analysis of alphabet undertaken in this connection led to further thinking on its reproduction on mass scale as well. Futurology of alphabet and printing is discussed in later chapters.

THE CHILD

The child faces a number of problems in learning to draw alphabet. The psychologists are agreed that the child would have to pass through the following mental stages by it sixth year:

1) Knowing its own limbs
2) Exploring its environment
3) Understanding the concrete
4) Understanding its society– simple relation ships with other human beings around
5) Understanding the abstract – simple emotions and the language.

In undergoing these stages, its faculties of sense-organs and mind would be constantly under going development – the degree of perfection which depends on the household, parents and society.

The capacity for such a development is however very great. representing upto a third of the maximum achieved by adulthood in such faculties.

Even with these achievements, everychild faces certain general difficulties in learning to write or draw its first alphabet, due to

1) improper perception
2) improper coordination of sense-organs involved in writing
3) incapacity for concentrating for long duration say not more than fifteen minutes at a time unless its interest is extroordinarily kindled.

Any parent or teacher is aware of the latter two and has his own ready made crude solutions for them. Loving parents bringing up their children with confidence on their future would be nearer to methods acceptable to psychologists, while parents (particularly middleclass) with their anxiety on the outcome of their children's performance in the ever loosing and permanent

race for employment would drift invariably into methods damaging the child. They are not elaborated here.

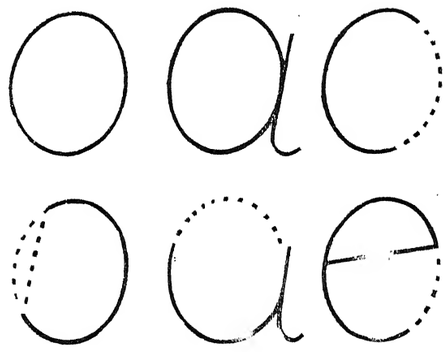
Many parents however are not aware of the limitations of perceptual powers of a human being and much less those of children. The parent proceeds on the unconscious presumption that the child sees the thing in the same manner as is seen by the adult which is not valid. Perception is subjective and the faculty in that direction depends, as greatly on the previous training and stage of mental development, as on the object perceived.

The ignorance of this basic fact imposes a great handicap on the parent or the illtrained teacher to understand the difficulty of the child learning alphabet. This lack of knowledge combined with anxiety over the future of the child can work and does work havoc on the tender mind of the child.

The difficulties of perception of a child relavent to alphabet learning are:

(1) The overall picture, the generality, is more easily perceived than the details. Only the dominant aspect is perceived.

(2) It cannot provide necessary gaps in the picture sometimes necessary. For example, if the child could fill in the gaps in its mental picture, as indicated in the following by dots, it could easily learn to write them all when once any of them is learnt. Unless the child is helped in this direction it cannot achieve it on its own.



(3) It cannot judge the sizes and shapes of the objects in an absolute manner devoid of context and hence experiences difficulty in keeping proportions required in alphabet writing.

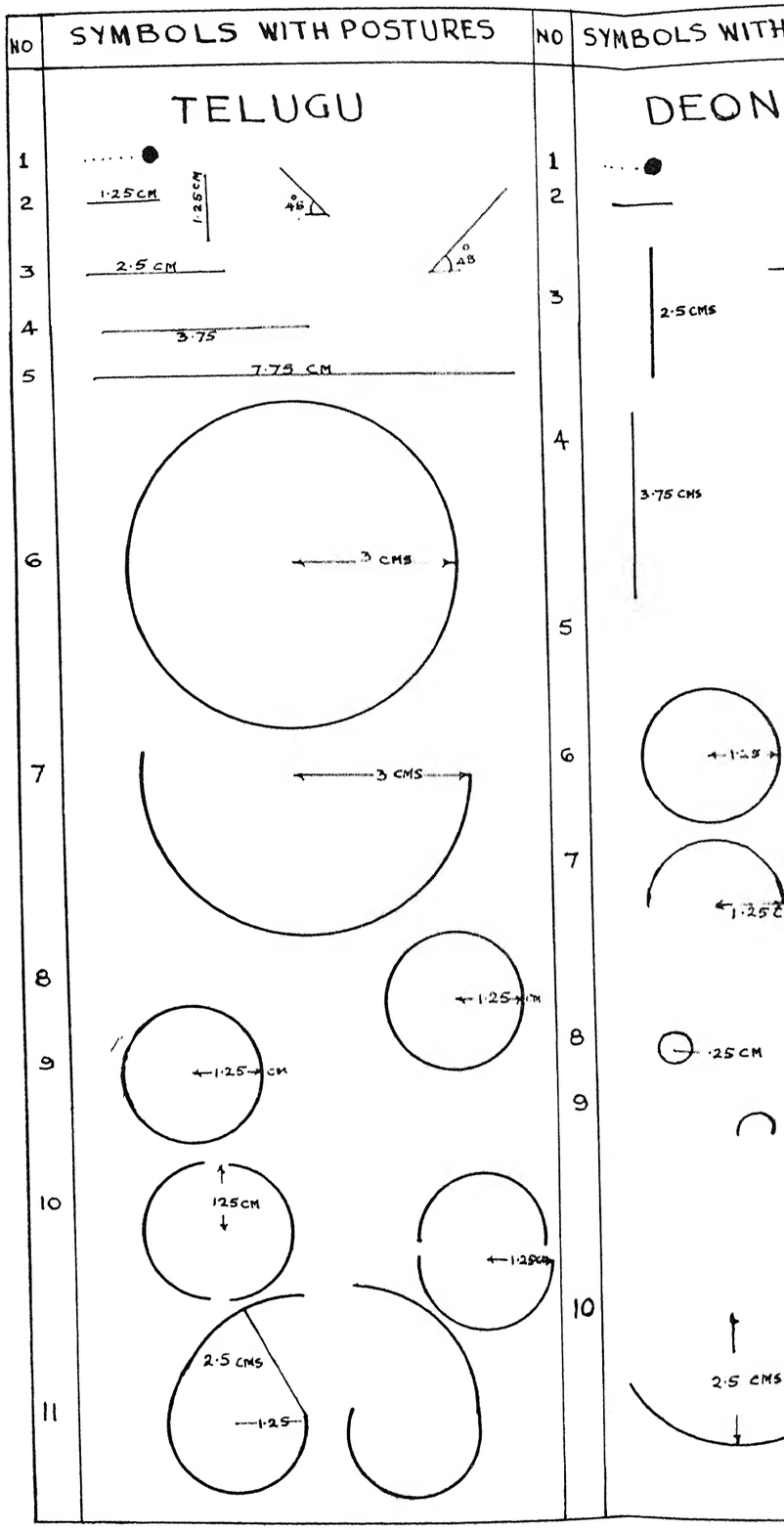
(4) Apart from these general difficulties, which even normal healthy children experience in perception, some may have certain special faults in perception resulting in vertically inverted letters, mirror images and the like.

(5) Another special difficulty in learning to write is the need to develop a muscular sense. One has to write without fully seeing what is being written at the moment. That is, when one is writing, what the movement of fingers or the writing instrument is producing can be seen only after the fingers or the writing instrument is lifted away. The correlation of movement of fingers etc., and the result produced on the paper perhaps never reaches the conscious stage and is mostly developed into an involuntary practice. This factor, in its full gravity, is not realized in any of the present practices of alphabet teaching. This factor particularly renders rotewriting useless, even if a child were sincere about it (which it never is).

It is in keeping with this situation that the new method is evolved to provide a simple practical method which would show an intelligent and interesting way of learning alphabet drawing.

THE NEW METHOD -

The method is called finite symbol composition method of alphabet learning, or, more simply alphabet building method. Finite symbol composition set or simply, alphabet building set, for language is a set of simple gemotric shapes whose combination can give any desired alphabet of the language. The symbols are so constructed that they are as few as possible, distinct and easily distinguishable to a child and easy of reproduction. The actual shapes of such sets for four languege Telugu, Deonagari English and Kannada, are given in the drawings in the diagram-I. Statements in Appendix I show their construction details of such sets for four languages. The alphabet formed with these sets are shown in Diagram-II.



DIAGRAM–1.

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The theoritical basis for the construction of the alphabet building set is provided in the next chapter. Similar alphabet building sets could be constructed for any script.

The finite symbols set of any language to be learnt is made available to the child in solid shapes, as well as grooves in blocks. They may be of wood, metal, clay, paper mache or plastic. Green or burnt clay is the cheapest while anodized, aluminium solids are best for handling at a moderate cost. The shapes may all be 5 mm thick and the other dimensions, as given in the statement above, measurable in the inner. In case of semicircle big, 4 times the thickness of the materials has to be added to the dia, so that smaller circles are contained when necessary. Upto ten percent allowance can be made on all measurements. Very perfect shape also need not be insisted upon, as the children are known to like imperfect ones better, but patterns should be definetely stuck to and should be definitely distinguishable to the child.

Solids are also distinctly coloured to incidate linear, circular and other curves separately say red, blue or green, yellow or black or white on subdued grey or lemon background. This renders the groups of connected shapes distinguishable to the child, linear, circular and curvular.

The teaching of alphabet by F.S.C. method may be tried upon any child or an illiterate adult who has attained the minimum level of learning preparedness or reading readiness. The child in F.S.C. method includes illiterate adult. Learning preparedness of the child is judged by the following standards for this method

1) Capacity to pronounce 90% of the alphabet (i.e) all except a few, which certain children learn to pronounce late for example rr. da, sha, za, zha.

b) Capable of independent handling of books. slates and writing instruments.

c) Capable of recognition of and distinguishing between straight lines, circles and curves in three or four sizes when the difference is not marginal but clear. Recognition of distinct colours.

d) Capable of concentrating on a job for at least twenty to thirty minutes, on a job interesting to it.

In teaching to such a child write alphabet. the following steps may be followed :-

1. PRELIMINARY : a child would do better. if further in addition to reading readiness. a minimum sense of part and the whole is created. This could be taught by training the child to arrange jumbled zig-ziag (fret saw cut-pieces) of plywood of any common object or being, which the child knows and could be interested in, for example, any common bird, animal or a pioce of architecture. 3 to 5 simple exercises (Simple in the sense that eaoh figure is formed by arranging just three or four zig-zag pieces) Six cubic block pieces may also be used for this purpose. One set of cubic blocks may be used to form six images on six surfaces of the blocks

a) Recognion of alphabet in bold types and two three or four lettered rhythmic words may be taught by training the child through guided reading, each sound and word uttered by teacher to be followed by child by similar utterance.

Picture card reading would help. The child should attain ability to read about 25 cards independently.

11. At this stage child could be given the simple pieces of finite symbol (alphabet building) set lines and circles to begin with, followed by other shapes and shown how letters are formed with the components of the set. The order in gradation could be as furnished in diagram II. The statements also show how the shapes of alphabet could be grouped in the order of similarity and derivation from certain common geometric shapes. Full letter models, cut out of plywood with fretsaw, each painted in such a way that different components of letters are distinctly shown by different colours would greatly help the child in the matter. After removal of the letter cut the original plywood piece would be left with a blank groove in the shape of the letter. This could be covered with cellophane paper pieces of different colours and used It can be arranged to project the letter shape as a coloured shadow on the screen. The child should learn to form any letter with the component symbol set on the basis of letter models, before it could be initiated into writing the alphabet proper. After the child can recognise not only all the individual component symbols but also recognise the alphalet as a combination of the symbols and can form about 25 letters independently with the finite symbol set, the child could be trained to reproduce each of the components carefully. The child could write these shapes using solids as templates, or by writing independently by trial and error or by rote writing in a limited manner. Rote writing however is to be avoided as far as possible. A wopden plank, with grooves cut in the component symbol shapes, will greatly help the child.

For those who can afford, a better proposition than simple bare groved pieces would be to use Digital slates, the drawings of which are given in separate drawings in Appendix II separately for each of the four languages and are described below :—

DIGITAL SLATE :

It consists of simple grooves cut in a plank or mild steel strips 2 or 3 mm wide, or, wire 1 or 2 mm thick embedded in a woden plank in the basic shapes of the required component symbols of a language. As mentioned in statement of symbols and shown in the drawing sheets(Appendix II)all symbols of the language need not be given but only representative shapes are given for initial practice. For example against 11 symbols only 4 are given for initial practice with their 4 important variable postures in Telugu. In Devanagari out of ten five are given with 3 important variable postures. In case of English against 11 shapes 5 shapes with 4 variable postures are given. In case of Kannada against 13 symbols only 5 with 4 variable portures are given.

These slates can be fixed with screws on a wooden stand with a rest for child' s hand. The slate position in the latter is adjustable in vertical plane and the distance of hand rest from the slate is also adjustable to suit the child through a screw set. The child holding a pencil in correct position will move it along the strips giving the digits suitable exercises for practsce. Then the child reproduces the shapes first in the adjacent or bottom narrow blank places painted black by close imitation independently. The ehild is thus trained to move its hand and fingers suitably in drawing the symbols. The writing instrument may be a wooden piece in the shape of a pencil with a sharp tip. In case the plank is embedded with steel strips or wire the pencil has magnetic tip which ensures that the child follows the strip without moving its digits astray. The pole strength of the magnetic tip may be about 5 x 10^6 units to prevent the child from going astray but at the same time not making it difficult for the child to move along the strip. The child can reproduce them independently, again, on the rectangular bottom blank space painted with black board paint or slate paint with a chalk piece or slate pencil provided.

In short the child with reading readiness could take the following steps mainly

1) Recognizing alphabet

2) Recognizing alphabet as a combination of finite symbols.

3(a) Understanding part and whole—forming full pictures with parts

(b) Composing alphabet with finite symbols.

4) Learning to write finite symbols

5) Writing alphabet

A better proposition than even the digital slates, however, would be a simple maehine Digital Major. This machine is useful in tralning the child to coordinate lts hearing seeing and digital motion involved in writing, which is so important in writing and which ability is as yet undeveloped. The principle of the machine is shovn in the diagram given in Appendix III. It consists of a simple contrivance to provide simultaneous impulses to three sense organs. The child is guided and directed to move its fingers in circles or circle parts of two sizes or straight lines in two perpendicular positions and two slant positions. This motion also produces notes which are definitely linked to the definite geometrical shape. The Digital motion in harizontal plane is also reproduced in a plane perpendicular to the plane in which the digit movement produces a shape in writing. The writing produced by digital motion is exactly reproduced in vertical plane, by heated wire or more simply but effectively a catherine circle or catherine line. For achieving this, the motion in vertical plane, though of same size, is about 15 times faster so as to create the illusion of line or curve, as the case may be, by persistance of vision. The child may move at the rate of one circle or a line per second without strain, to begin with and for the same to be reproduced in vertical plane the motion is kept at a speed 15 times faster than the speed of digital motion of the child. This enables the child to see what the movement of its fingers is produoing even before the pencil tip is lifted or moved away from the shape it is producing. The musical sounds linked to movement of fingers and the geometric shapes produced, help the child in distinguishing the shapes and remembering the shapes as well as their relationship with the movement of fingers. The practice on this machine ensures a quick and correct ability to produce symbols for the child. After mastering the shapes the child could be trained to write alphabet in steps shown in Diagram II a, b, c, d. Thus the child would learn all alphabet in steps. Practice for some time would enable it to write the alphabet as a continuum.

The advantages of this method are :—

1. It reduces the period required by a child to learn alphabet.
2. It reduces greatly and even eliminates the drudgery.
3. It develops the intelligence of the child, in course of learning to write alphabet.

This Finite Symbol Composition set, the digital slate and Digital Major are the first of its kind in helping the children to learn to write alphabet of a language in easy steps, after giving simple graded and regular practice in coordinating the eyes, fingers and ears.

It has already been mentioned that the children's perceptual powers are not fully developed at that age and their capacity to perceive the details compared with that of perceiving the whole is low. if not faulty. This is one of the factors which has to be overcome by the child in learning to write alphabet. Great educators have tried to resolve the confiict in children arising out of their imperfect and undeveloped perception and the external pressure on them (children)to perfectly perceive and learn to reproduce correct to the detail, the minidrawings (alphabet), by achieving the overall and general mental development. They seem to proclaim as it were "Don't start teaching with writing alphabet straight. Dont be impatient to see your child writing each alphabet in short time. Develop their allround mental faculties and they will write not only different alphabet but sentences at one stroke when once they achieve a stage of mental development."Madam Montessoric speaks of writing-explosion in children of three to six years, mentally developed through her methods by specially trained teacher. There could be no two opinions about the course of overall mental development of a child, but, it is achieved only with extreme care, sympathy and efficiency of the teacher in a specially created atmosphere for children, so rare in our society, particularly in the field of primary education. By this method, even in the present normal shools children could be taught alphabet through intelligent methods at low cost by adoptinp this system.

This is the first attempt to analyse the shape of each alphabet anb classify them into finite symbol components and to provide an aid for the child to pereceive the details of alphabet perfectly and vividly, and to provide a method to teach every alphabet in steps and in order of graded diffioulty experienced by the child in writing, rather than, in the order based on origin of sounds etc.,or anything, except, the convenience of the poor child.

This art of alphabet teaching by F.S.C. method is applicable to all languages. It is possible to reduce any alphabet. whatever be their number, to a small number of the simple component shapes very similar to that given for four languages and the method suitably adjusted ro suit any particular language and envinonment of the child. System worked out to four scripts could be exteneded to all other scripts.

THE LAW

The finite symbols gfven for the alphabet of a language may be compared with the bricks of a building.

Infinite possibilities of archetectural pieces are given rise to, by multiples of a few types or sizes of bricks. For choosing brick size itself there may be infinite possibilities (at least theoritically) but choice could always be limited to a finite number. In further analysis, the brick itself is composed of innumerable particles, but, that does not matter. Still bricks are bricks and any structure is built out of bricks.

Another example could be given to explain this phenomenon, this time, an abstract one. A finite number of integers give rise to infinite numbers. The choice of integers is in itself not limited. We have ten common Hindu-arabic integers, zero to nine. Computer technicians use two integers. Each integer may itself give rise to infinite number of fractions. But for any system of counting, the total number of integers could always be finite and small - may be random, may be selective in consideration to various (nongeometric) factors.

Mathematical reasoning for the above is as follows :—

Let us take any set of curves f(x), f(y), f(z)....

Let us choose a small dash of length $\triangle x_1$, with which we make up the entire f(x), (ie) f(x) is numerically divisible by $\triangle x_1$, Nx_1 times leaving a remainder x_2; x_2 is naturally smaller than $\triangle x_1$.

$$\text{Then } f(x) = Nx_1 \triangle x_1 + x_2$$

$$\text{Similarly } f(y) = Ny_1 \triangle x_1 + y_2$$

$$f(z) = N3_1 \triangle x_1 + z_2$$

..... and so on

Then a smaller dash $\triangle x_2 < \triangle x_1$ is chosen to divide x_2 and the latter divisible by Nx_2 times and a still smaller remander x_3, say, is obtained.

$$\text{Then } f(x) = Nx_1 \triangle x_1 + Nx_2 \triangle x_2 + x_3$$

$$\text{Similarly } f(y) = Ny_1 \triangle x_1 + Ny_2 \triangle x_2 + Y_3$$

$$f(z) + Nz_1 \triangle x_1 + Nz_2 \triangle x_2 + z_3$$

..... and so on

This process taken further would lead to

$$f(x) = Nx_1 \triangle x_1 + Nx_2 \triangle x_2 + \cdots \quad Nx(n-1) \triangle x(n-1) + x_n$$

$$f(y) = Ny_1 \triangle x_1 + Ny_2 \triangle x_2 + \cdots \quad Ny(n-1) \triangle x(n-1) + y_n$$

$$f(z) = Nz_1 \triangle x_1 + Nz_2 \triangle x_2 + \cdots \quad Nz(n-1) \triangle x(n-1) + z_n$$

.... and so on.

At each successive operation, the remainders Xn, Yn, Zn become smaller and tend to vanish. Similarly $\triangle x_n$ tends to become dimensionless.

At limiting stages,

$Xn = Yn = Zn \cdots \cdots = \triangle Xn$

$$\therefore f(x) = Nx_1 \triangle x_1 + Nx_2 \triangle x_2 + \cdots \quad Nx(n-1) \triangle x(n-1) + Xn$$

Similarly $f(y) = Ny_1 \triangle x_1 + Ny_2 \triangle x_2 + \cdots \quad Ny(n-1) \triangle x_{n-1} + Xn$

$$f(z) = Nz_1 \triangle x_1 + Nz_2 \triangle x_2 + \cdots \quad Nz_{(n-1)} + \triangle x_{n-1} + Xn$$

Thus by next operation, by $\triangle Xn$, all the functions would have been divided without any remainder.

Now adding up

$$f(x) + f(y) + f(z) + \cdots\cdots$$

$$= \triangle x_1 \, (Nx_1 + Ny_1 + Nz_1 + \cdots\cdots)$$

$$+ \triangle x_2 \, (Nx_2 + Ny_2 + Nz_2 + \cdots\cdots)$$

$$+ \triangle x(n-1) \, (Nx_{n-1} + Ny_{n-1} + Nz_{n-1} \cdots\cdots)$$

$+$ N'$\triangle$xn where N' is the number of functions given.

In the above, Nx_1, Nx_2, $Nx_3 \cdots Nx_n$

as also Ny_1 Ny_2, Ny_3 etc., as also N' may be finite or infinite. But n would alwyas be finite.

Tnis fact could also be shown to hold for areas and solid shapes, if we could choose $\triangle x1$. $\triangle x2 \cdots$ $\triangle x_n$ to be small area bits or solids and repeat the argument.

From the above we see that N, n and $\triangle x$ are three variables based on which any set of N' number of geometric functions can be resolved into components. Expressed in common language, the governing factors are :-

1) The number of each type of components and total number of components into which a system is split.

2) Number of types of components.

3) The shape and size of each type of the component.

In the context of the child learning to write alphabet, the further requirements influencing the above factors are :—

1) The child should be able to recognize, distinguish and reproduce the components easily. Tnis is the foremost requirement.

2) Secondly, each alphabet should be composed with as few symbols or components as possible (i.e) the number of components per any alphabet should be easily manageable to a child.

3) The total number of components should also be as few as possible per set so that they could be handled easily and the cost is as low as possible.

I do not propose to go into the argument on how my finite symbol composition set given in Diagram I appendix-I satisfy these conditions. Their further refinement or modification after further experimentation is not ruled out.

It is now clear that any system of alphabet could be resolved into a finite and smaller number of simple components, whose combinations could yield the alphabet.

The application of this principle to children's education may be a bit obvious. But it has deeper implications. The field where its application is not so obvious, namely the process of composing in a printing press is dealt with in the next chapter.

ALPHABET PRINTING - COMPOSING FASTER THAN SPEECH?

MULTILINGUAL AND MULTIPOINT TYPE CASE.

That the alphabet could be formed out of finite symbols and that the finite symbols for different languages are similar, could be made use of, to evolve a common set of symbols from which alphabet of multiple languages could be formed. A statement showing such a common symbol set for three languages– Telugu, Deonagari, and Kannada by collecting common symbols and the remainders is given in Appendix–IV. The Drawings of symbols from which the alphabet of Telugu, Deonagari, Kannada and English could be formed is also given in diagram–III.

This opens up a new possibility for printing industry. Simplest application (may not be commercially feasible on a large scale at the moment) would be to compose alphabet from a comman symbol set for any set of languages, eliminating huge type cases with thousands of pegeon holes and also simplyfying the process of distribution after printing.

The obvious and presently, very valid. objections to this innovation would be that

1) The number of picks which a composit or type setter has to make per piece of matter increase fourfold or fivefold.

2) The letters formed would be unstable and the composing sticks, the galleys and the formats in use cannot hold the formed alphabet tight for proof reading, printing etc.,

Even with these disadvantages, the common symbol sets could be useful in composing small pieces of information simultaneously in a number of languages. For example. in case a matter is to be printed in four languages, the normal type cases required would contain somewhere around two thousand pegion holes for a particular point of letters, whereas about thirty types of pieces would be sufficient to compose according to F.S.C. method. The alphabet could be formed or built on a thin layer of moltenwax base, fixed. photographed and the negative dealt with in the usual way for printing. The thickness and material of the symbols could be so chosen to suit photography. Since photography can yield different sizes and different slants also from the same object the type case of the finite symbols would not only combine the advantages of multilingual alphabet but multipoint alphabet as well

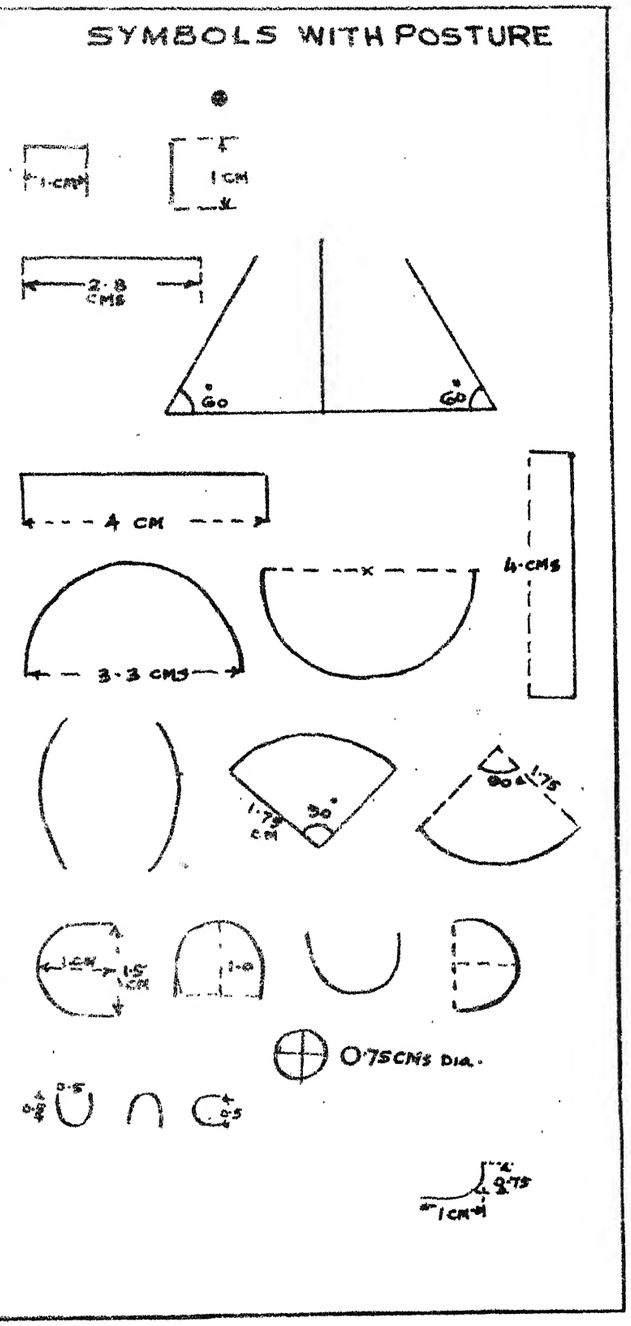
APPROPRIATE TECHNOLOGY :

Before we could turn to the objections and examine the feasibility of Commercial application of F.S.C method for printing, we may dilate a little into the concept of appropriate technology, relavant to this context.

Printing was developed in the west for nonphonetic scripts and at a time when general technological level was still low. Printing developed around the embro of Holy Bible copyists. Interaction of printing on script and script on printing, as well as, printing methods versus printed material is a fascinating story by itself, not neccessary to be elaborated here.

COMMON SYMBOL SET FOR FOUR LANGUAGES.

S.NO	NAME	NO. PER SET
1	DOT	2
2	MINI LINE	3
3	SMALL LINE	4
4	BIG LINE	2
5	SEMI CIRCLE	1
6	ARCH	5
7	PARABOLA	5
8	MINI CIRCLE	4
9	MINI PARABOLA	2
10	CORNER CURVE	1
	TOTAL	23



Developments in printing technology are so advanced that they are aweinspiring and taken to be universal without second thought. The spontaneous tendency of every developing language is to copy it. Such copying faces formidable and sometimes insurmountable difficulties and the script is blamed for this ! Sensible and sincere persons suggest script reform and even wholesale changeover to Roman Script for easy adaptation to advanced technology for printing and communications.

However, I feel that one of the steps of alphabet printing namely, composing, immediately needs a new approach in case of phonetic scripts. Even the most advanced process of printing technology– the linotype and monotype, fundamentally involves operation of fingers in getting requisite letters imprinted or punch marked, basically by lever action. This is inevitable in case of an unphonetic script but quite irrelavent and surely avoidable in case of a phonetic script. The concept of appropriate technology has good scope of application and deserves deep exploration, here.

The new approach should result in a new type of composing machine which could do away with digital typing. Moreover this could the first step in outdating Gutenburg (or whosoever it be, since his title to fatherhood of printing is contested in some quarters) as the developments over his invention and allied items, including printed surfaces like paper, are about to reach a blind alley. The information communication, as also its record, are multiplying manifold. In proceeding to conquer the universe, mankind is progressing towards more and more creative activity too fast for the present printing technology to cope up with.

My idea of a future composing machine for a phonetic scripted language is that it should produce alphabet straight from pronounciation because definite sounds have definite alphabet, a set pattern of drawing, and the spellings follow definite rules, as well.

We know that pronounciation of diffrent sounds produces different pressures. This property, combined with the property of carbon particles, whose electrical resistance varies with the density, is made use of in telephones and microphones. These properties could as well be made use of in inventing new composing machines.

At various parts of the world attempts are afoot to produce visual "sounds" and machines to identify speech and understanding speech. The computer at Toranto University Canada, The American Computor "Brick", the machines at the Institute of Linguistics of Georgeon Academy of Sciences, U.S.S.R, are some examples. Their efforts are directed to make the machine identify speech and understand it. It is said that the "Brick" "Knows" 16 words, 10 numbers and six special "orders" relating to arithmetical operation with numbers. That the work of a computor costs lot of money, resources and time is well known. The achievements are also said to be easy jobs, when compared to obstacles, cybernetics has to overcome, before it can claim to have solved the problem of identification of speech. As regards the more difficult problem of understanding speech "At present the machine cannot understand any of the living languages".

Against this background, the reader may see that basically the machine proposed here is not associated with computor technology in its basic structure, though it certainly may make use of computor techniques.

THE AUDIO COMPOSING MACHINE — FASTER THAN SPEECH :

The new audio composing machine works on the principle of performing work on the basis of the variations of pressure created in a sound field.

All the sound machines like telephone, microphone, loudspeaker, radio, tape record and record player, have been engaged in faithful reproduction of sound. But the recording steps involved in these are such that the records are intellegible only when they are reproduced to be heard.

The sound in the new audio-composing machine may be made to pick up suitable letters (or letter components for onward assembly) to be composed. As fast audio composing machines develop, what course the printing machines and printed material and surfaces take to, would be a matter of pure conjecture at present, not dilated into, here.

Without going into the theory of sound, we know, that speech produces variations in pressue, which is made use of in telephone, microphone etc. Such changes are specific for each sound since the sounds are faithfully reproduced at another point. The only difficulty faced in this phenomenon is that in some cases the variations are too near each other and tend to overlap giving rise to mistakes- one sound mistaken for other. (The worst joke in this area appears to bc when once a shipping agency was telegraphed as a shitting agency on hearing to dictation on phone). This is matter requiring development of further sensitivity which has scope for improvement.

It is feasible for this property of sound to be made use of in composing. The various steps involved are shown in the diagram IV.

Speech, as spoken by a person, or a tape on which normal human speech is recorded and played faster than speech, produces soundwaves which are picked up by microphone. The microphone creates electrical variations in a circuit which are reproduced at two points simulteneously, in an electric bulb S_1 and an electromagnet M. The electrical bulb S_1 shows fluctuations in illumination which in turn are picked up by the photoelectric cell P_1. The resultant variations are communicated to the electron beam E_1 produced from cathode C_1 through magnetic fields caused by plates MP_1P_1 and MP_1P_2. The electron beam is consequently defelected and tilts a lamina L_1, placed in its path. The lamina has a reflecting surface, perpendicular to its plane of tilt, on which a vertical light beam is directed from a light source S_2. Consequent on the deflection of reflecting surface attached to L_1 by an angle θ, the light beam from S_2 is defelcted by twice θ If the deflection range of the reflecting surface is kept at, say, 120^0 the beam can be deflected upto 240^0_4. In the circular parth L' OL" where light beam strikes the surface, about 600 photo electric cells are placed and each cell completes a circuit. When the light light beam strikes a cell the particular circuit is enlivened and the electro

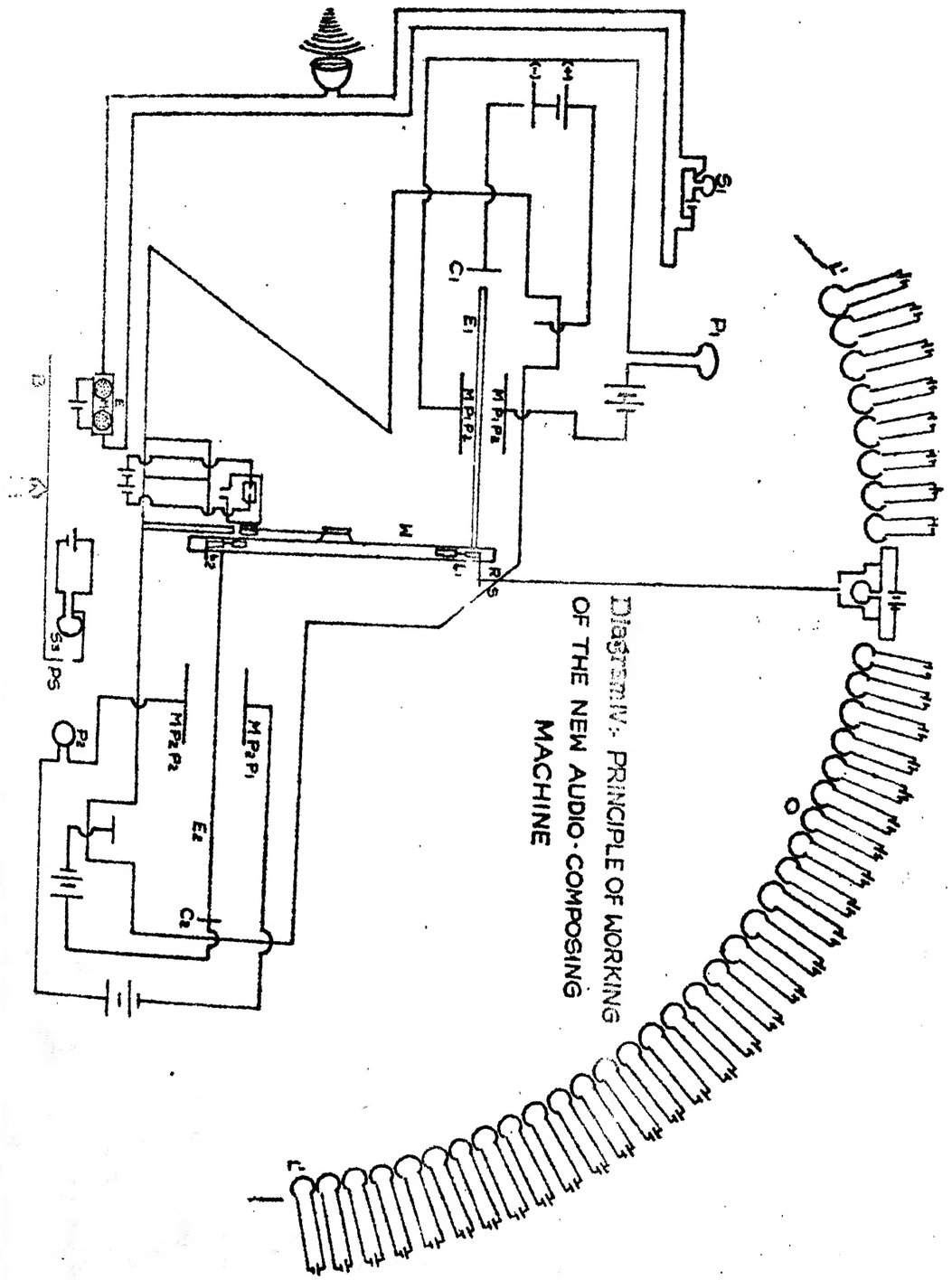


DIAGRAM IV: PRINCIPLE OF WORKING OF THE NEW AUDIO-COMPOSING MACHINE

magnet in each cell may be made to pickup or drop- the relavent letter for placement on compositor's stick or for making an impression on a semi solid to take its print and solidify or just light a neon sign in the shape of the letter required Alternately the neon gas filled letter or the letter type with bright polished surface could be brought to a table surface, when the circuit comes to life and is illuminated to be photographed on a moving strip of sensitive film. The letter could be treated in the usual way for further processes in printing.

Before further discussing on this aspect, we may return to our tilting lamina L_1 for a while. The tilting lamina, with polished surface R.S. attached to it vertically, is fixed on to a circular plate or a wheel along its circumferance. The circular plate or the wheel is made to revolve by a motor attached to it, so that, the free tilting lamina frames, face the electron beam in quick succession. Instead of a motor, the circular plate or wheel can also be made to revolve through another electronic beam acting in the plane of the 'C' wheel but vertical to that of electron beams E_1 and E_2. As the wheel rotates. the lamina or frame that is tilted by electron beam E_1, moves down and faces the electron beam E_2 and regains its original position loosing its tilt. This is achieved by electron beam E_2 which is equal to E_1 in all respects expect in direction, which is opposite to that of E_1. The beam is also deflected by the same variations of magnetic field with appropriately modified direction through magnetic fields caused by plates MP_2P_1 and MP_2P_2. The variation in magnetic fields is caused by the photo electric cell P_2 which faces the source of illumination S_3. A partition screen P_S which covers the light source S_3 from photo electric cell P_2 is attached to a light and highly sensitive seasaw lever or beam moving about a knifedge. The left arm of the sea-saw beam is just below an electromagnet which is connected in the Circuit in which microphone is placed. The speech variations cause variations in magnetic power of the electromagnet which attracts miniature iron balls and drops them on to the beam. The time taken by the balls to fall from the electromagnet EM to the beam causes the necessary time lag required for the lamina to travel from top position L_1 to bottom position L_2 (i.e) the time taken for the wheel to make half a revolution. The seasaw beam B in continuous motion moves the screen and causes proportionate field variations between MP_2P_1 and MP_2P_2 which in turn defelect the electron beam which rectifies the tilt in lamina. The rectification of deflection of the lamina may also be done by simpler method with sensetive hairspring arrangement by which the lamina regains its position after it moves off the position where the electron beam E_1 acts upon it. But its accuracy and speed may not match that of the arrangement proposed which is rather complex. Other circuits creating appropriate time lags may also be used, but the accuracy may not be high. If photography is undertaken, the distribution of types can also be instantanious. The same device conveying the type below the camera lens can also bring it back. Photography undertaken on a moving strip would also give the added advantage of adjustment of size of the letters without need of having diffe- types for different points of the same letter. Even if the method of obtaining an impression on a semisolid which then instantaneously solidifies for further utilisation in the normal process is adopted, the problem of distribution of types may not arise since the type die may be brought back to the original position by the same device carrying it for impression.

FINITE SYMBOLS, COMPUTOR AND THE AUDIO COMPOSING MACHINE :

The new machine conceived and expounded so far works on a relatively simpler mechanical. electronic and electromagnetic phenomena.

Finite symbols and computor could greately improve the efficiency and widen the application of the machine.

All the letter circuits arranged on the encircling ring L' OL" could be connected to a computor. The memory of the specific symbols and their orientations for each sound represented by a defiection of the light beam from the reflecting surface R.S. of the previous diagram is stored up in the computer. Such a computor should be able to pick up the suitable symbols and place them on a board where they have to be oriented or arranged to form suitable alphabet. Whether (or not), the computer could be trained to do it straight from the microphone connections without the need for translating the minute electrical variations into movements of light along L' OL'', also needs to be explored with reference to convenience and cost.

One way in which the computer and finite symbols could be made to compose to speech may be as indicated in the diagram IV(a).

An endless conveyer collector E. C. C. moves in a horizantal plane. The conveyer is divided into a number of parts depending on the symbols or components to be collected. The symbols to be collected are stacked each in a seperate revolving stack (R.R.S), just below the conveyer collector. The revolutions per minute of the stacks relative to moving conveyer are so adjusted, that is, the particular stack faces a particular part of the conveyer, always.

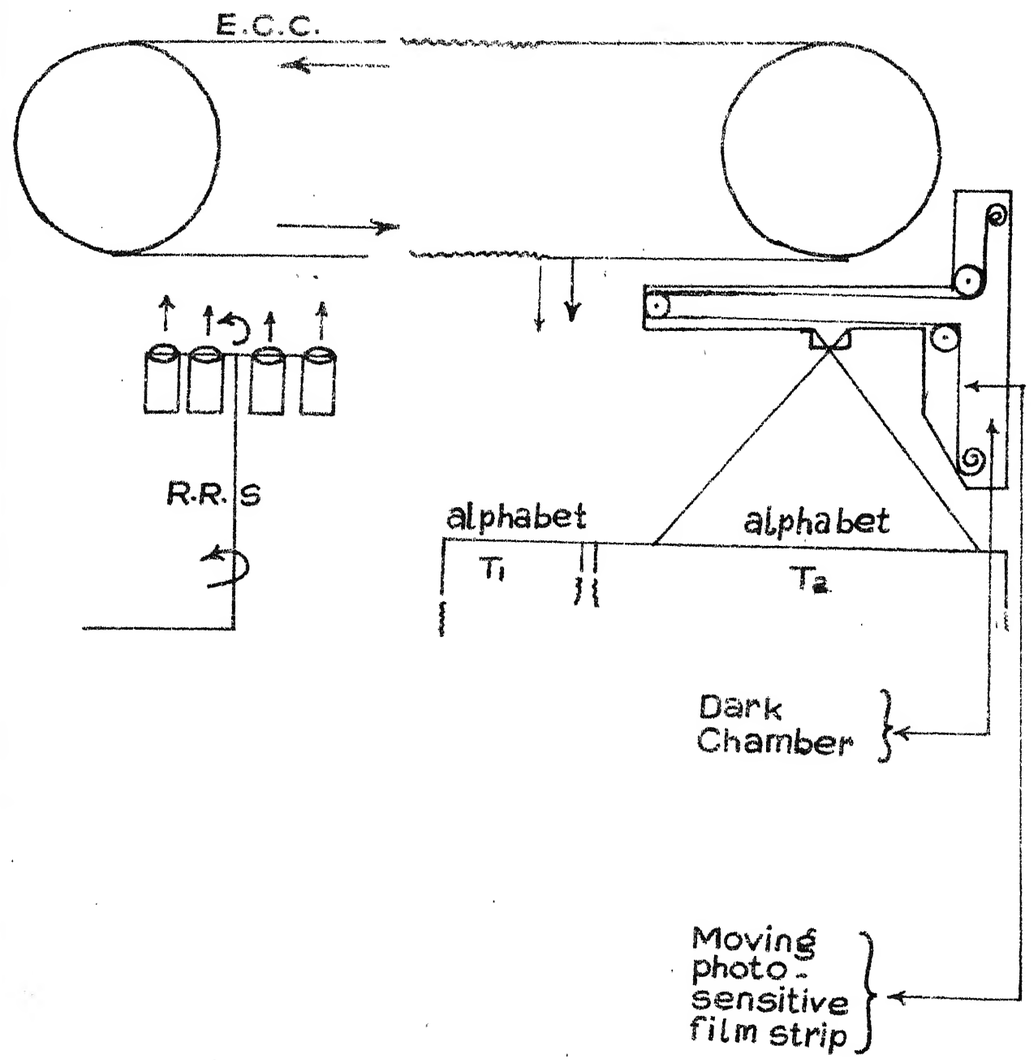
The eletrical variations produced directly from the microphone. or, as magnified by the light beam, form the imput to the computer (the machine man) in whose memory is stored the particulars of finite symbols and their orientations of the alphabet relating to the particular electrical or luminous variation. The computer soon after it receives the imput signal, works in three dlrections.

Firstly it creates magnetic fields, in such parts of the moving conveyer which face the stacks of the required symbols and drops them on the table T_1.

Secondly it creates successive magnetic fields on the table T_1 (this is the more difficult task) with suitable lags, so that. as each component falls down on a table T_1, they take their position of orientation in alphabet. Perfect registering is a problem to be tackled by another electronic device or by a simpler method of rendering the gaps insignificant or invisible by reduction to required size in photography by keeping the symbols and the consequent alphabet formed by them sufficiently large.

The third task for the computer would be to move the alphabet formed to an

Principle of working of the letter forming devise of the audio-composing machine using Component symbols.



appropriate place to be photographed, or, dealt suitably, otherwise, for printing and redistribution. Here the process is rendered complex by the fact that the speed of the photosensitive strip cannot be uniform, since the time for formation of the alphabet is not the same for all alphabet, but varies with the number of symbols and the dissimilarities of their orientation.

When the machine is to be used for different languages with phonetic scripts, to print their present alphabet, the circuits from L' OL" have to be arranged differently for each language to pick up the relavent alphabet. That is, the circuits vary with language and there have to be as many circuit sets as the number of languages.

Use of finite symbols for a set of languages, however, eliminates the need for huge store of multiple alphabet and the complexity of arranging them. However the computer has to be trained to pick up relavent symbols for a sound of the language in question, orient them to form the relavent alphabet and move it to under the camera at appropriate intervals. That is, the memory store varies with a language and there have to be as many memory storages, as the number of languages, it should operate for.

If the machine has to work for non-phonetic scripts, in addition to the above three operations, the robot has to be taught the spelling and given the capacity to choose the proper spelling from the variations in possible or probable spelling for the same sound pronounced. Special features like use of capital letters also need to be stored.

This audio visual composing machine is not a piece of baseless fiction. It is not the alchemy of medieval chemists, the eternal machine of medieval physicists nor the immortal nector of ancient Gods. It is conceived as something that should be very much possible, provided the society wills so.

A seperate project could be under taken to study the feasibility of this proposition.

I have dreamt. The first step is taken. Like any other, the dream waits on the shores of Lethe to be brought forth to life – the Lethe of financial, technical and social problems, which can be overcome, not by discussion, but by force of action and action alone.

THE FUTURE

Having witnessed placement of man on the moon, having witnessed gigantic projects involving billions of dollars or roubles or yen in many fields–constructive and distructive, having witnessed epochmaking social upheavals at regional, national, continental and global levels, our generation has developed a high degree of credulity. Hence the financial, technological and social problems involved in realising the practical appl cation of audio-composing methods in printing may not appear insurmountable to us.

High capital cost would be allayed by the volume of production demanding wide extension of market. The same machine could compose scripts of many languages and the composed material could be exported to be readily printed at any place, (i.e) the composing operation may get centralized on a continental or global scale, bringing down the cost of composing per unit piece of information or area, to a very great extent.

Telenews broadcasting to be read by a community from common News Tower Boards directly and through optical devices costing low and requiring nil repairs in their homes will also have to be evolved for further expansion of the market.

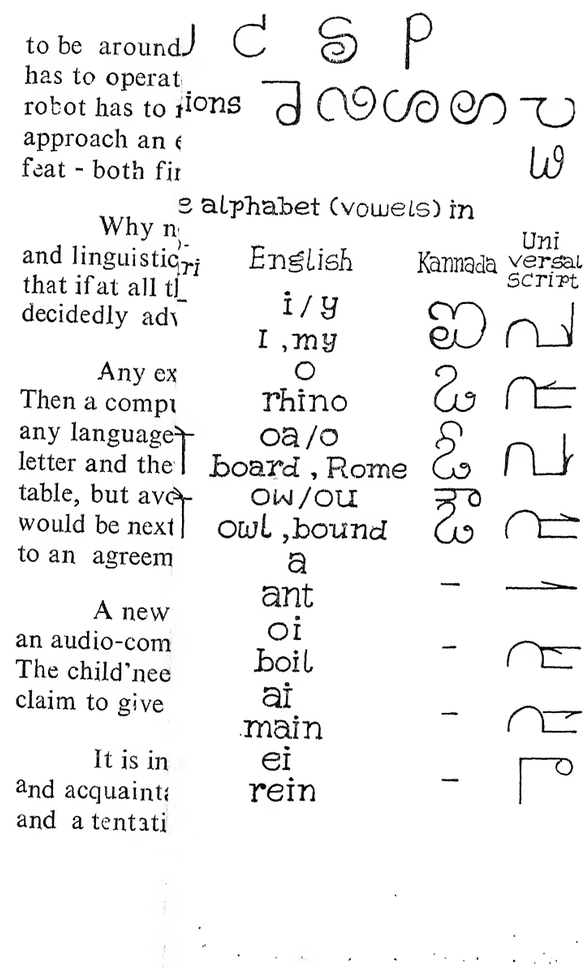
The nature of alphabet would however ereate certain restrictions on the scope of audio_ composing machines which need to be diseussed briefly.

In the chapter "The Law" it was shown that the finite symbol components for given system of shapes were governed by three variables N, n, and △X (i. e) the total number of all the components put together as well as the number of components of each type, the number of types of components and the shape, size etc., of each type of component.

It may also be recollected here, that the components given earlier in Appendix I and diagram I were derived for convenience of the child learning alphabet, with no eye on efficiency in printing.

From the point of convenience in printing, separate common symbol components cou'd be evolved. The top factor being the number of components per alphabet to be as low as possible. At least the range has to be as small as posaible. The equality in number of componants per alphabet being ruled out completely, other factors would be (i) simplicity of each of each component shape enabling it to be mechanically handed with ease, and (i i) to have as few variables in orientations as possible.

Even when finite symbol components satisfying all the above norms are found, still the memory store of the audio composing machine will have to be seperate for each language. This renders the number of operations to be stored in memory of such an audio composing machine



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In consonant-vowel syllable of the new script, only the arrow is used. It touches the consonant symbol in 8 cases of its orientations. In 8 other cases - ఁ, ం, ఄ, ఁ, ఄ, ౅, oi, ai, (ie) all cases where it is used in combination with ఌ, to represent a vowel, the arrow is used singly with the consonant, but, without touching it.

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D. Usage I.

Item	Existing Alphabet	Writing in the new Script as per Common convention for all languages with consonant symbol to read.		Different conventions in		
		With no vowel	With the vowel ಅ/अ/(cut)	Hindi	English	Telugu group
Consonant - vowel Combined.	क Ka/Cu ಕ ಕ			mid. word word end		
Bare Consonant	क् K/C ಕ್					
Consonant - Consonant - vowel	प्ल ಪ್ಲ plu (pluck) ಪ್ಲ	ಅಲ	ಅಲ or ಅಲ	ಅಲ or ಅಲ or ಅಲ	ಅಲ	ಅಲ or ಅಲ
Consonant - Consonant - Consonant - vowel.	त्म्य ತ್ಮ್ಯ thmya ತ್ಮ್ಯ	ದಮ್ಯ	ದಮ್ಯ or ದಮ್ಯ	ದಮ್ಯ ದಮ್ಯ	ದಮ್ಯ	ದಮ್ಯ ದಮ್ಯ

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e. Usage li :-

మహాత్మా	ఫోర్డ్	న్యూటన్	వోల్గా	బ్యాంక్
మహాత్మా	ఫోర్డ్	న్యూటన్	వోల్గా	బ్యాంక్
SANSKRIT महात्मा	फोर्ड्	न्यूटन्	वोल्गा	बेंक्
HINDI महात्मा	फोर्ड	न्यूटन	वोल्गा	बेंक
ಮಹಾತ್ಮಾ	ಫೋರ್ಡ್	ನ್ಯೂಟನ್	ವೋಲ್ಗಾ	ಬ್ಯಾಂಕ್
Mahathma	Ford	Newton	Volga	Bank
ಮಹಾತ್ಮಾ	ಫೋರ್ಡ್	ನ್ಯೂಟನ್	ವೋಲ್ಗಾ	ಬ್ಯಾಂಕ್
ಮಹಾತ್ಮಾ	ಫೋರ್ಡ್	ನ್ಯೂಟನ್	ವೋಲ್ಗಾ	ಬ್ಯಾಂಕ್

Each alphabet is formed by one symbol or combination of two symbols only - one representing vowel sound from V group and another from C group representing consonants.

The V group consists of only one symbol which has 8 various orientations each giving two vowel sounds in compounding with consonants. If placed adjacent to consonant touching it, one sound is pronounced. If placed adjacent to a consonant, but, without touching it. different sound is produced. When required to denote the second set of 8 vowels (represented by touching the adjacent consonents). indepenpently, they are used in combination with a seperate symbol taken from C group. Sixteen alphabet thus derived from vowel symbol are used for representation of 15 vowels and a nil vowel position. A symbol from consonant group is also used for a vowel sound.

Similarly out of 48 shapes derived from 6 aymbols, forty are used for 41 consonant sounds, one is used for second set of vowels, one for a vowel seperately and six shapes are in spare. One seperete symbol is also shown in spare for sounds not covered by the given alphabet. In case of the second set of 8 vowels. different symbols could have been used. but it is avoided to keep the types of symbols at the minimum number with optimum number of orientations.

Depending on the nature of problems to be faced in picking up symbols and orienting them, the final universal alphabet could b- suitably derived from suitable refinement of these. Till the audio - composing, audioe typing and audio - reproducing techniques are finalized or at least basically standardized, the proposed alphabet could only be tentative.

There may be innumerable ways in symbolizing about 800 common syllables of a language formed by combination of one sound from a maximum group of 20 vowels and one or two from about 40 consonants, depending on the tools of writing, printing–technology etc., Two extremes would be, to have one symbol with 800 orientations or 800 symbols, each for a sound. In between lie the rest. e.g., we may have

Consonants			Vowels		Total
No. of Symbols.	No. of orientations of each.		No. of symbols.	No. of orientations of each.	No. of approximate sounds.
40	1	x	20	1	= 860
20	2	x	10	2	= 830
10	4	x	50	4	= 815
5	8	x	2	10	= 807
The alphabet proposed however are with					
6	8	x	1	8+8	= 776 — 5 spare = 771

The script is used as in case of any phonetic script each syllable represented by the combination of consonant and vowel symbols usally. The following conventions are proposed for different groups of languages for convenience.

In Telugu, Kannada and Deonagari every consonant symbol given is to be pronounced with 'అ' ‑ ಅ sound. The finite symbol ಽ however need not be written with consonant in these languages as it is rendered redundant. Where a consonant symbol is required to be pronounced without any vowel the symbol ‑ is attached to it. The symbol ಽ is always without vowel succession. The symbols ಬ , ದ when attached to preceding alphabet, are not pronounced with vowel ending.

In consonant – consonant compound the first consonant is written with ‑ attached, or instead, it is attached direct to second consonant as convenient.

(2) In English the consonant alone is pronounced for the consonant symbol without attaching ‑ symbol to it. However ಽ symbol is attached where necessary (i.e) where a consonant is required to be pronounced with 'u' (as in cut) sound.

(3) In Hindi the consonant at the end of the word is pronounced without any vowel;

but in the beginning or middle of a word if it pronounced with ' ಽ अ sound. Hence at the end of a word, symbol ‑ need not be attached, to denote the consonant ending. If अ ಽ ending is required at a word-end, the symbol ಽ is to be attached. In the middle or beginning of word consonant need not have ಽ attachment for अ ending where as ‑ is necessary where nil vowel consonant is required. Consonant – consonant – compounds are formed as in (1) above. The convention in respect of ದ , ಬ is same as in (1) above.

(4) In attaching the vowel symbol in handwriting no rigid stance is prescribed for registration. But in printing it may have to be developed.

Now, it may be questioned whether this difference in conventions in different languages, does not contradict the very concept of universal script. No, it does not. As long as the symbols are the same, it may not make any difference. No person ordinarily studies the identical materials in two scripts. On the otherhand the different conventions contribute to saving of linear space in use in the concerned languages.

However, the matter, whether different conventions for the same symbols could be allowed, or not, could be settled only after the standard audio – composing machines are developed and their convenience is also considered. A common covention regarding the pronounciation of the consonant symbols with an oft used vowel like ಅ , u, or(ಇ , i), or whether, without any vowel sound at all, for all languages. could be decided by technologists of the audio–composing machine and the multilingual public at large. The listed words given along the diagram V show the use of the new script with common and different conventions while the passages given in the Appendix VI, show the usage in different conventions. They also denote that the new script is suited for different subjects as well, since, different subjects like folksongs, nutrition, philosophy and education are covered by transliteration.

This script combines the advantages of the phonetic Indian scripts and unphonetic English script. Firstly, all alphapet are written in one line stream as in English. The disadvantages of vowel and consanent compounding by addition of vowel symbols at top or bottom of consonants are eliminated. Only right hand side of a symbol is used for the purpose. Secondly all compounding of alphabet to form syllables is done by regular patterns avoiding all irrational ways. Each vowel and consonant sound is represented by a definite, unambiguous shape which renders spelling easy and rational. At the same time, thirdly, vowel shapes are simplified to take an ancillary position visavis consonants bringing about economy in space. Fourthly the thickness of a line of alphabet and space requirement between lines also get reduced by not allowing symbols to be written below the line. For example letters lg, ಇ, ಯ್ಹ would get reduced to

Appendix VI referred to in this page and the number denoted as Appendix VI at the end may kindly be read as Appendix V.

Fifthly all proper nouns and common words look identical In all languages. Further similar words and syllables, belonging to diffrent languages, also have similar shapes, which is useful in reproduction of selected multilingual scripts.

In its application to printing, the conveyer ECC (diagram IV a page 17) has to pick up one of the Symbols C1 C2 C3 C4 C5 C6 stacked at RRS and places it on table T_1. Symbol (V) could fall straight from a stack above the table T_1 in the position required. Where there is no vowel compounding one of symbols from ‚C' family alone is picked up and dropped to proper position on Table T_1, Symbol V not being required. The orientations also become limited to four positions mentioned above each with lateral and vertical inversions, giving rise in all, to 16 shapes. The total operations, that a robot has to perform in composing any language get reduced to about 1500

The advantage of this script in learning is really immense. The prolonged practice of drawing alphabet, to which a child is subjected to, is almost eliminated. The need for a specially acquired technical skill of moving fingers for a shape is eliminated. Alphabet building with one solid V symbol and six consonant symbols in various positions would train it in recognition. Since there is a regular and simple pattern of formation, the writing is rendered easy. Writing each symbol by itself will not be difficult and skill can be acquired without difficulty. So the child can concentrate on reading only. In course of reading, recognition of alphabet– awareness to a sound– shape couple, becomes a natural part of child's memory repertory and it can begin writing to its own urge to write at a suitable age without special prior pratice. The writing even from its inception becomes a true effort and a tool for self expression, eleminating the initial struggle for form. The dichotomy between happiness of self– expression and the unhappiness of the struggle to reproduce lifeless regid shapes, to practice irregular and unreasonable combinations to form meaningful combination, would vanish altogether

Strange, I began with a search for an easy new way out for the child, struggling to write its initial alphabet. But I have ended in altogether abolishing the need for any type of special training to write or reproduce them ! Once it can recognize the universal script, can't the child learn to write, for its mere asking?

APPENDIX-I

SYMBOLS FOR TELUGU SCRIPT

S.No.	Symbol name.	Dimensions when thicknes of line is negligible.	No. for a set.	Dimensions when thickness has to be taken into account. t mm
1	2	3	4	5
1.	Dot	Nil	1	Mass circle 2 t dia
2.	Miniline	1.25 cms	3	No alteration
3.	Unit line	2.5 cms	2	No alteration
4.	Trimini line	3.75 cms	1	No alteration on thickness
5.	Big line	7.5 cms	1	2 thickness are added
6.	Big circle	6 cms dia.	1	Inner dia 6 cms
7.	Big semi circle	6 ,,	1	4 thickness are added.
8.	Small circle	2.5 ,,	4	Inner dia 2.5 cms.
9.	Incomplete circle	2.5 ,,	1	—do—
10.	Small semi circle	2.5 ,,	5	—do—
11.	Arc with or with out semicircle	Arch 5.0 and semicircle 2.5 cms dia	3	—do— Inner lengths
		Total	23	
	Symbols to be provided in digital slate S Nos.			2 (in 3 positions), 3 (in 3 positions), 6 and 8.

2. SYMBOLS FOR DEVANAGARI SCRIPT

1.	Dot	Nil	1	Mass circle with 2 t dia.
2.	Mini Line	1.25 cms	2	One or 2 thicknesses added in some cases Si, while retaining one miso line, in all cases of linen next higher line may replace the lower line.
3.	Unit line	2 5 cms	5	
4.	Trimini line	3.75 cms	2	2 thickness added
5.	Long line	5 „	2	2 thickness added
6.	Small circle	2·5 cms dia	1	Inner dia
7.	Small semi circle	2 5 „	5	„
8.	Mini circle	0 5 „	2	„
9.	Mini semi circle	0.5 „	2	„
10.	Arch	5.0 „	1	„
		Total	23	Total No. per set increases by one

Symbols to be provided in digital slate S Nos:- 2 in two positions; 3 in two positions; 4; 7; and 10 in 2 positions;

3. SYMBOL FOR ENGLISH SCRIPT

I	Dot	Nil	1	Mass circle with one or two thickness dia.
2	Mini line	1.25 cme	4	no alteration
3.	E. line	3·2 „	2	—do—
4.	Curve end line	3.0 „ X 1,0 cms dia curve end.	2	curves inner dia
5.	Curve ends line	3·0 line with 1 cm dia curves at both ends.	1	—do—

6.	Ellipitical	3.5 X 2.0 cms	1	Inner dia
7.	Parabolic	1.75 X 2.00 cms	2	—do—
8.	Open elliptical	3.5 X 2.0 cms	1	—do—
9	Tuft	1+3.0 X 0 75	1	plus t and inner (3 x.75)
10.	Eye	1 0 X 1.5	1	Inner
11.	Mini circle	0.5 cme dia	1	—do—
		Total	17	

Symbole to be provided in digital slate :- S Nos. 2 in four positions
3 in two positions
6, 8, 9.

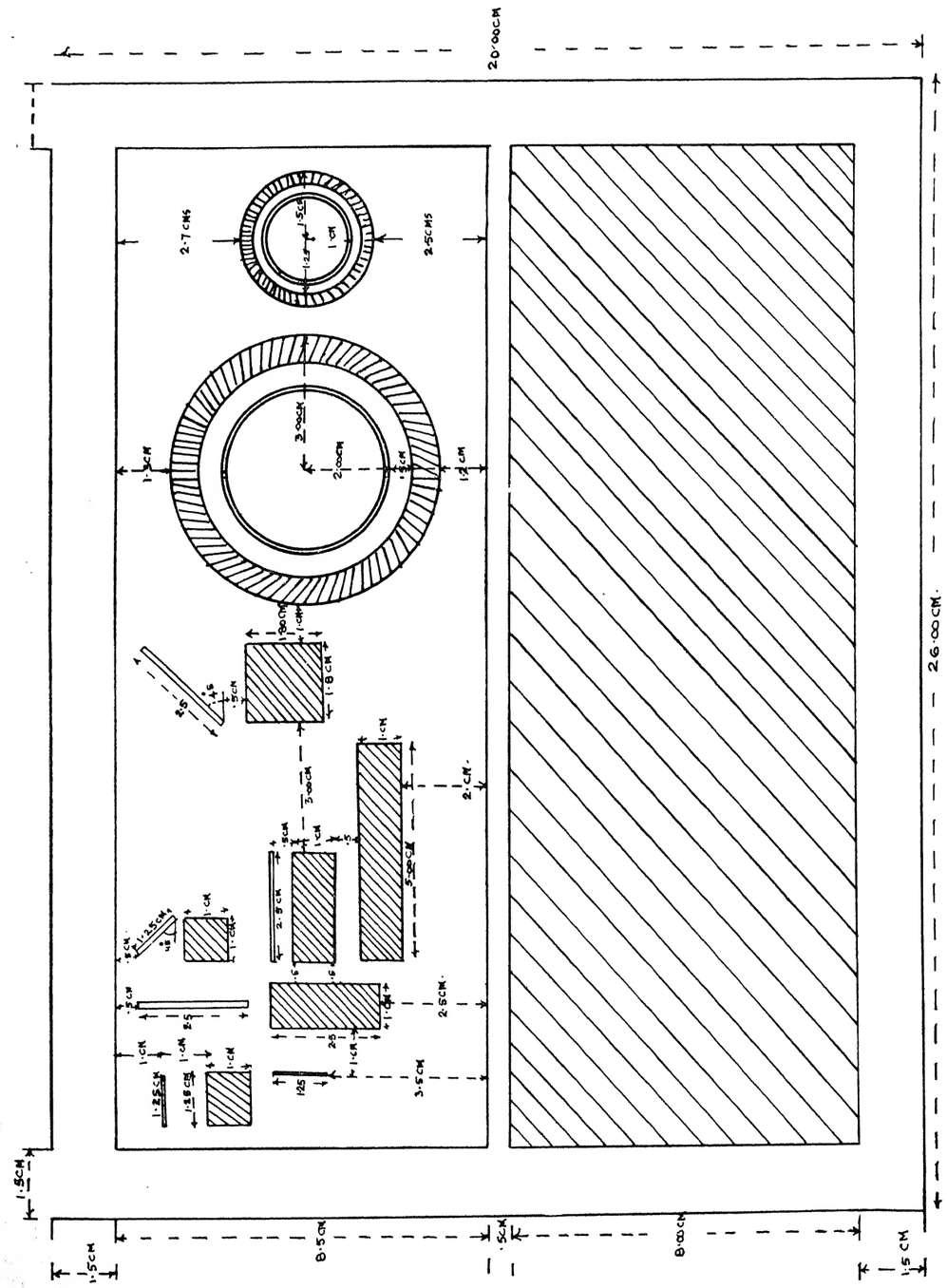
4, SYMBOLS FOR KANNADA SCRIPT

1.	Dot	Nil	1	Effect of thickness same as in Telugu in all common cases.
2.	Mini line	1.25 cms	3	
3.	Line	2.5 „	1	
4.	Di unit line	5.0 „	1	
5.	Tri unit line	7.5 „	1	
6.	big circle	6 „	1	
7.	Big semi circle	6 cms dia	1	
8.	Small circle	2.5 cms dia	4	
9.	Small semi circle	2.5 „	4	

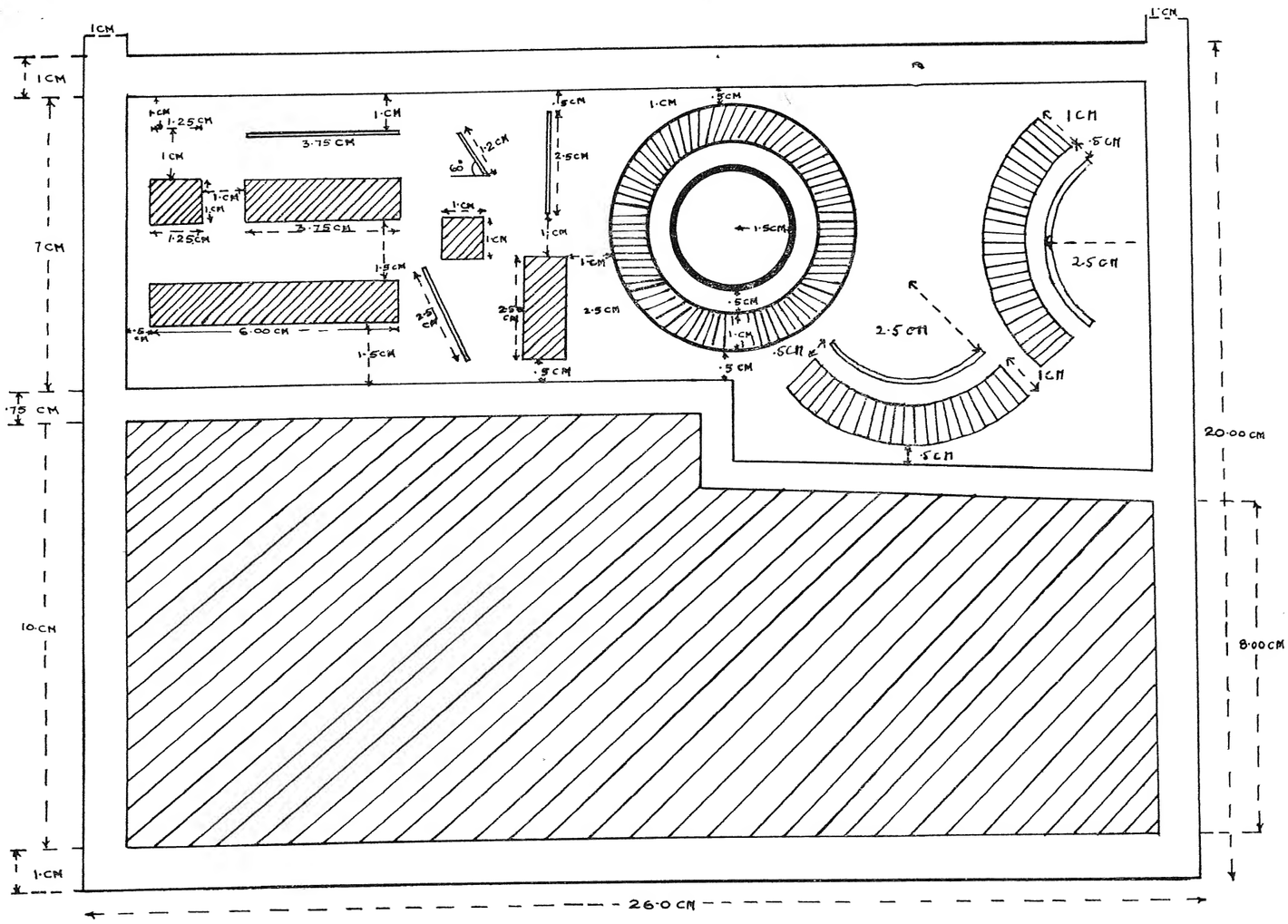
10.	Mini circle	0.5 „	1	
11.	Arch over semi circle	5 „ 2.5 „	5	
12.	Corner	1 cm 1/2 or 3/4 dia	1	inner curve dia
13.	'e' Curve	1 cm X 1/2 dia	2	1 cm plus t plus 1/2 cm. inner dia.
		Total	26	

Symbols to be provided in digital slate;- Same as for Telugu plus 12 and 13.

APPENDIX II a



APPENDIX II b



AREA TO BE PAINTED BLACK FOR WRITING

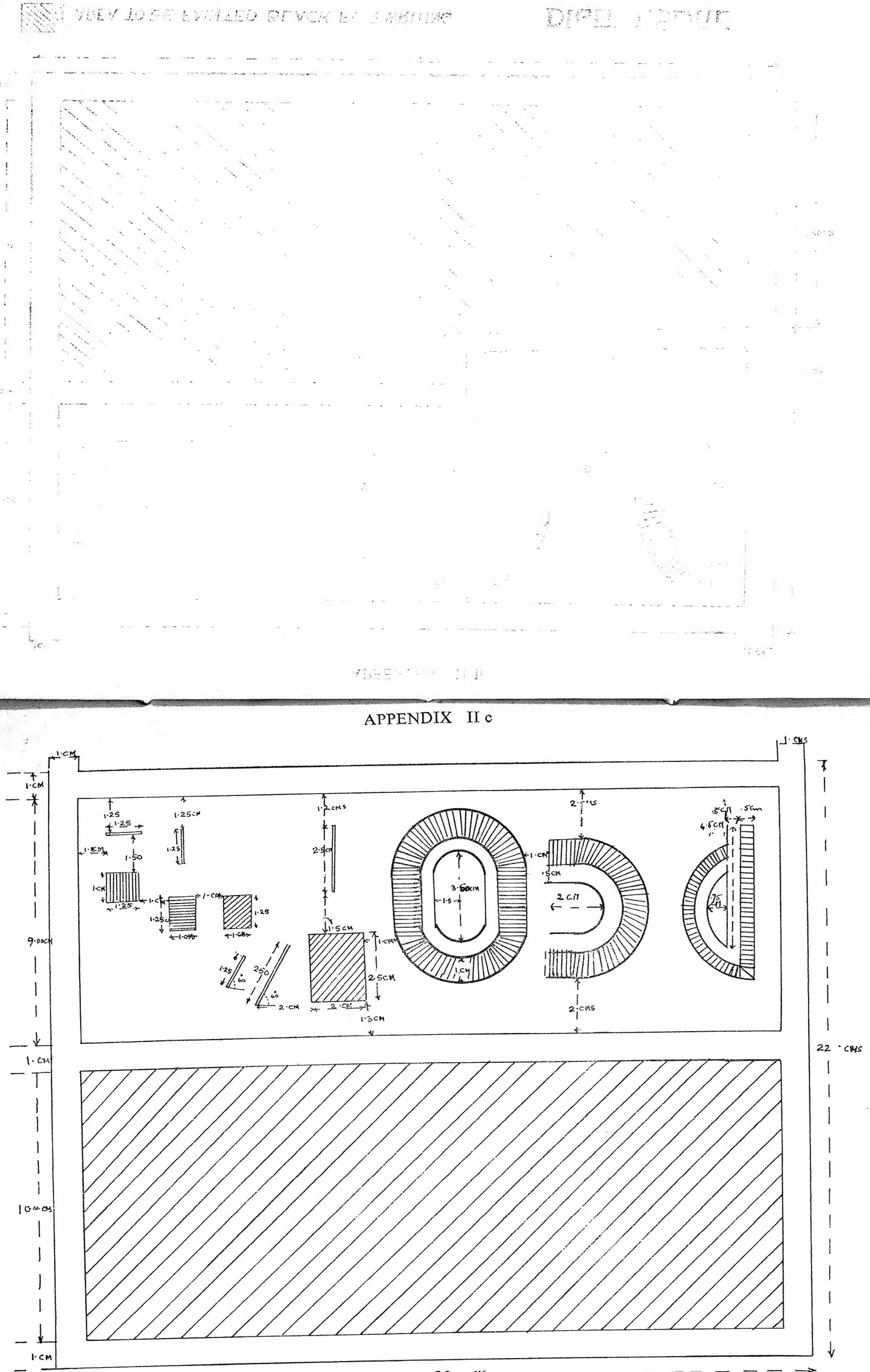
DIGITAL SLATE

GROOVES IN FRAME OR WIRE INLAY.

NOT TO SCALE

DEONAGARI

APPENDIX II c



SPACE PAINTED BLACK FOR WRITING

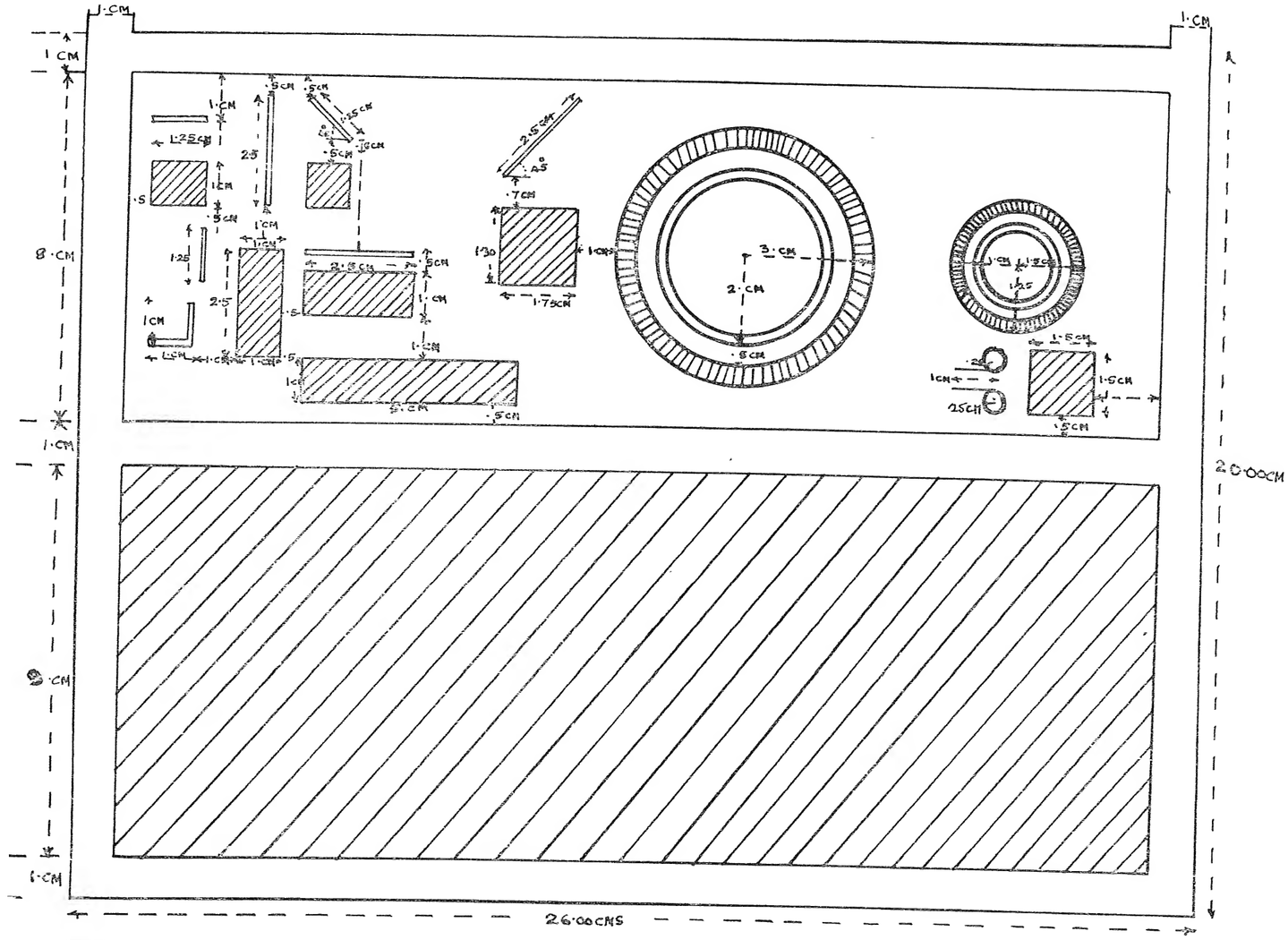
A GROOVE OR WIRE INLAY.

NOT TO SCALE

DIGITAL SLATE

ENGLISH

APPENDIX II d



AREA TO BE PAINTED BLACK FOR WRITING.

GROOVES IN FRAME OR WIRE INLAY.

DIGITAL SLATE

NOT TO SCALE

KANNADA.

Appendix II. Digital Major

H: Handle for the teacher to operate to guide and control childs digits holding pencil tips fixed at one of the positions S_1 or S_2 or S_3 or S_4 at which S can be placed along S_1S_1, S_2S_2, S_3S_3 and S_4S_4, by adjustig $S_1S_2S_3S_4$ the inner circular plate.

$S_1'S_2'S_3'S_4'$- Corresponding points to $S_1S_2S_3S_4$ of the catherene st. line movement of S.

C_1 Pencil tip for guiding child along big circle.			C_1'	Corresponding points of catherene circle.
C_2	,,	,, small circle.	C_2'	
Ph	,,	,, horizontal paraboda.	P'h'	
Pv	,,	,, verticle ,,	P'v'	

$G_1G_2G_3$ Gear wheels set. OO'PO" axis for the circle C_1

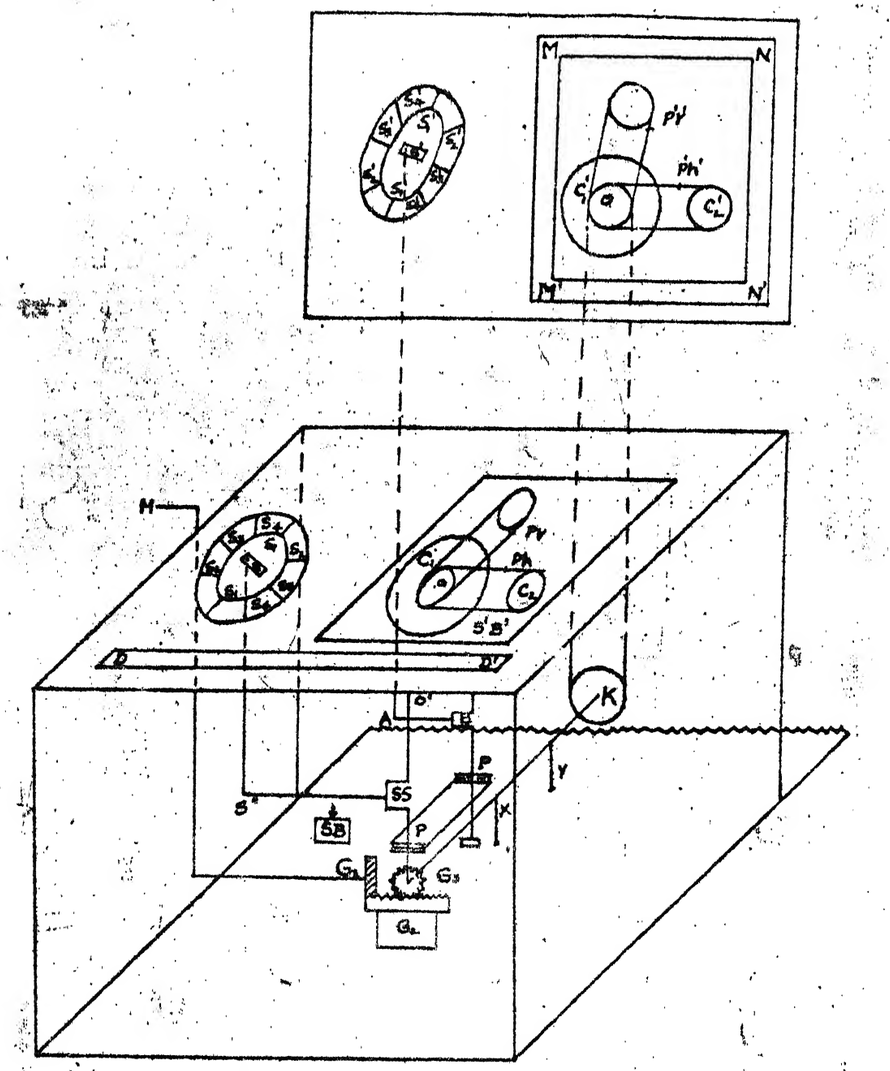
SS" SS:- Contrivance for moving S. O'K. axis for moving pulley K which drives C'.

SB. Sound box contrivance for producing specific sounds for specific st lines S_1S_1 etc.,. S'B' sound box contrivance for producing specific sounds for specific big circle, small circle, vertical parabola and horizontal perabola.

P. Pulley set for moving BAS. XY Supports for axis KO".

DD' plank for the resting of child's palm, which writting with pencil tips S, C_1C_2, Ph and PV.

MM' NN' - Grooved frame to cut out from view or screen the required portion of catherene circle or parabola as the case may be (ie) when only semi-circle, arch, etc., are required.



APPENDIX - IV

COMON SYMBOLS SET FOR THREE LANGUAGES

(Telugu Deonagari & Kannada)

S.No.	Name	No. per-set.	Dimensions as in Statement (1)
1.	Dot	1	...
2.	Mini Line	4	1.25 Cms.
3.	Unit line	5	2.5 Cms.
4.	Di-Unit line	2	5.0 Cms.
5.	Small Sememi Circle	5	2.5 Cms Dia
6.	Incomplete circle	1	2.5 Cms Dia
7.	Mini circle	2	0.5 Cms. Dia
8.	Mini Semi circle	2	0.5 Cms. Dia
9.	Arc	5	5.0 Cms. Dia
10.	Corner	1	1 Cm x 0.75 Cms.
	Total	28	

Variations when thickness is taken into account is as in Statement I.

Appendix VI : Passages in the Universal script Transliterated from various Languages :

A. Telugu

(i) కటు పదార్థం క్రింది మిరియాలు వాడతారు. కటురసం ఆకలిని పెంచుతుంది. ఆహారాన్ని జీర్ణంచేస్తుంది. రుచిని కలిగిస్తుంది. శ్లేష్మాన్ని హరిస్తుంది.

[illegible]

(ii) 1వ తరగతి. గుల్లబల్లపై వ్రాసిన అక్షరములనే పలకపై వ్రాయుట అలవాటు చేయవలెను. చిన్నపదములను చింతగింజలతో పెట్టించవలెను. 2వత॥ ఇంటి గోళ్ళలో అక్షరముల ప్రమాణము చూచి వ్రాయుట నేర్పవలెను. కాపీ వ్రాయుటలో మాదిరి తెలుసుకొని ఒకదానిక్రింద నొకటిగా చిన్నవాక్యములు చూచి వ్రాయవలయును. 3వత॥ కాపీట వ్రాయుట ఇంటిపనిగా ఈయవలయును. 4వత॥ ఇంటివద్ద చూచివ్రాతను ప్రోత్సహించవలె. 5వత॥ ఇంటివద్ద చూచివ్రాతవ్రాయు అలవాటు వృద్ధిచేయవలె.

[illegible]

— x —

B. English:-

A writer is among the best specimens of the self employed class. Wri ting a book is a very private affair. But it is also one of the most public spirited of the private enterprises, the whole purpose of which is to entertain, inspire, edify and make us all better and wiser men.

ಬ ಗಣಿಗ ←ಲ ।ಳ ಷಟ ಏ ಕ।ಔ ಔಅ
ಔ।ಕಷ←ಔ ವಕ ಏ ಔ। ಓ ಕ।ಳ ಅ←ಔ ೈಓಔ. ಗಣಿಷಟ ಬ
ಕಿೈ ←ಲ ಬ ೪। ಗ। ಅ೧ಗ೪೪ಣ ವಕ←ಗ. ಕಣಿಣ ←ಲ ಇ.
ಔ। ೪ಳ ವಕ ಏ ಓ।ಔಣ ಅ೧ ಕಬಟ ೈ ಔ ಅ೧ ಗಣಿಔ । ಕ
ಏ ಅ೧ಗ೪೪ಣ ಬ ಕ ಓಳ ಗ ಅ ಗಳಓಔ, ಏ ←ಬಇ ಅ೧ ಗಅ೧ಔ ವಕ
೪←ಬ ೮←ಲ ಣಿ ಬ ಕಕಣಳ ಗಣ←ಕ, ಕಕಔಅ೧ಗ, ಬಔಔಕಗ
ಔಣಔ ಓ।ೈ ಕಲ ಇಇ ಕ।ಣಗ ಔಣಔ ಗಳಓಗ ಓ।ಕ.

A.T.P + Muscle proteins → contraction of muscle + ADP.

ಬ ಳಅ೧ + ಓಳಓಇ ಅ೧ಗ←ಔಣಕಔ → ೈಕಣಗ←ಔಇಣ ವಕ
ಕ। ಅಔ←ಔಣಕಇ ಔಗ + ಔಅಗಇ

ಓಳಓಇ + ಬ ಔಅ೧.

—×—

C. Sanskrit :-

यद्यद्विभूतिमत्सत्वं श्रीमदूर्जितमेववा ।
तत्तदेवावगच्छ त्वं मम तेजोंऽशसंभवं
[illegible]
तापात् वेधात् च निकषात् सुवर्णमिव पण्डितैः ।
परीक्ष्यभिक्षवः ग्राह्यं न तु मद्वाक्यगौरवात् ॥
[illegible]
इडागमः केषांचित् धातूनां भवति । न सर्वेषां
उदृदन्तैः यौति रुग्णुशीङ्. स्नु नृ क्षु श्वडीङ्.
श्रीभिः । वृङ् वृञ्भ्यां च विनैकयो ऽ जन्तेषु
निहताः स्मृताः । ऊकारान्ताः ॠकारान्ताः युरु....
इत्येतेषां धातूनां भविष्यत्काले इडागमः भवति ।
नान्येषां स्वरान्तानां धातूनां । अयं नियम सर्वत्र
धातु के षूपयुज्यते ।
[illegible]

D. Hindi:-

इन लघु इकायियों द्वारा जो रोजगार दिया गया है, वह बडी इकायियों, जिनमे अचल संपत्ति पर लाखतककी पूंजी लगी हुई है, की तलनामे पांच गुण अधिक है.

[illegible]

लघु उद्योग प्रति कृपया ध्यान दे

[illegible]

ईश्वर शाक है राम रहीम और खुदा ईश्वर के

ही नाम है.

[illegible]

E.Kannada :-

ಸಾಮಾನಿಕ್ಕಿದ್ರೆ ನಾಲಮದಿಂ ಡಿಕ್ಕೊಬೇಕು .

ನಾಲ್ವರ ಎಂಟುಲ ಬಿಡಬೇಕು .

ಗಂಧನಿಕ್ಕಿದ್ರೆ ಚೆಂದಾದಿಂದಿಕ್ಕೊಬೇಕು .

ಕಂಡೋ ೞಲ ಎಂಟುಲ ಬಿಡಬೇಕು .

[illegible]

[illegible]

[illegible]

[illegible]

ಮುದ್ರೇ ರೇಕ್ಷಸವು ಸಂಸ್ಕೃತ ನಾಟಕ ವಾಙ್ಮಯದಲ್ಲಿ ಒಂದು ಅಪ್ರೂರ್ವ ವಾದಕೃತಿ. ಕಥೆಯವಸ್ತು ಕೇವಲ ರಾಜಕೀಯ ತಂತ್ರ . ಇಲ್ಲಿ ಉದ್ದಕ್ಕೂ ಕಾಣಬರುವುದು ಆಯುಧಗಳಘರ್ಷಣವಲ್ಲ; ಬುದ್ಧಿಗಳ ಘರ್ಷಣ. ಚಂದ್ರಗುಪ್ತನ ಪರಮ ಶತ್ರುವಾಗಿ, ಅವನನ್ನು ಕೊಲ್ಲಿಸಬೇಕೆಂದು ಪವಣಿಸುತ್ತಿದ್ದ ರಾಕ್ಷಸನು ಕಡೆಯಲ್ಲಿ ಅವನಿಗೇ ಅಮಾತ್ಯನಾಗಿ ನಿಲ್ಲಲು ಒಪ್ಪುವಂತೆ ಮಾಡುವದೇ ಇಲ್ಲಿ ಚಾಣಕ್ಯನ ಉದ್ದೇಶ.

[illegible]

— x —